A.10.2 SM 1232 analog output module specifications

Table A-149 General specifications

Technical data	SM 1232 AQ 2 x 14 bit	SM 1232 AQ 4 x 14 bit
Article number	6ES7232-4HB32-0XB0	6ES7232-4HD32-0XB0
Dimensions W x H x D (mm)	45 x 100 x 75	
Weight	180 grams	
Power dissipation	1.8 W	2.0 W
Current consumption (SM Bus)	80 mA	
Current consumption (24 V DC)	45 mA (no load)	

Table A-150 Analog outputs

Technical data	SM 1232 AQ 2 x 14 bit	SM 1232 AQ 4 x 14 bit
Number of outputs	2	4
Type	Voltage or current	
Range	±10 V, 0 to 20 mA, or 4 mA to 20 mA	
Resolution	Voltage: 14 bits Current: 13 bits	
Full scale range (data word)	Voltage: -27,648 to 27,648 ; Current: 0 to 27,648 Refer to the output ranges for voltage and current (Page 1247).	
Accuracy (25 °C / -20 to 60 °C)	±0.3% / ±0.6% of full scale	
Settling time (95% of new value)	Voltage: 300 µs (R), 750 µs (1 uF) Current: 600 µs (1 mH), 2 ms (10 mH)	
Load impedance	Voltage: ≥ 1000 Ω Current: ≤ 600 Ω	
Maximum output short circuit current	Voltage mode: ≤ 24 mA Current mode: ≥ 38.5 mA	
Behavior on RUN to STOP	Last value or substitute value (default value 0)	
Isolation (field side to logic)	none	
Isolation (24 V to output)	none	
Cable length (meters)	100 m twisted and shielded	

Table A-151 Diagnostics

Technical data	SM 1232 AQ 2 x 14 bit	SM 1232 AQ 4 x 14 bit
Overflow/underflow	Yes	
Short to ground (voltage mode only)	Yes	
Wire break (current mode only)[1]	Yes	
24 V DC low voltage[2]	Yes	

[1] Short circuit detection is only possible when the output voltage is less than -0.5 V or greater than +0.5 V.

[2] Wire break detection is only possible when the output current is greater than 1 mA.

Table A-152 Wiring diagrams for the analog output SMs

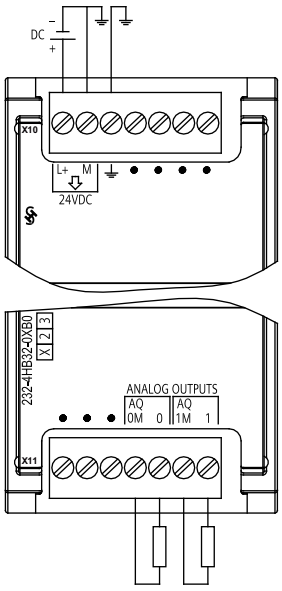
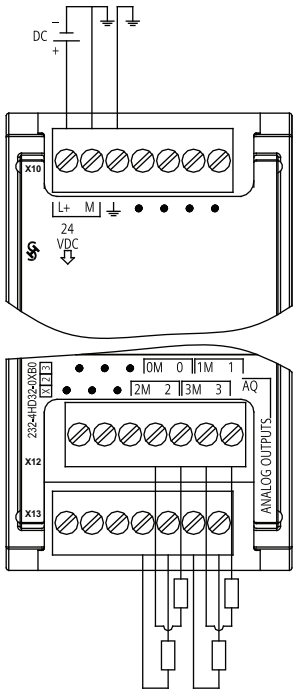
SM 1232 AQ 2 x 14 bit (6ES7232-4HB32-0XB0)	SM 1232 AQ 4 x 14 bit (6ES7232-4HD32-0XB0)
	
Note: Connectors must be gold. See Appendix C, Spare Parts for article number.	

Table A-153 Connector pin locations for SM 1232 AQ 2 x 14 bit (6ES7232-4HB32-0XB0)

Pin	X10 (gold)	X11 (gold)
1	L+ / 24 V DC	No connection
2	M / 24 V DC	No connection
3	Functional Earth	No connection
4	No connection	AQ 0M
5	No connection	AQ 0
6	No connection	AQ 1M
7	No connection	AQ 1

Table A-154 Connector pin locations for SM 1232 AQ 4 x 14 bit (6ES7232-4HD32-0XB0)

Pin	X10 (gold)	X12 (gold)	X13 (gold)
1	L+ / 24 V DC	No connection	No connection
2	M / 24 V DC	No connection	No connection
3	Functional Earth	No connection	No connection
4	No connection	AQ 0M	AQ 2M
5	No connection	AQ 0	AQ 2

Pin	X10 (gold)	X12 (gold)	X13 (gold)
6	No connection	AQ 1M	AQ 3M
7	No connection	AQ 1	AIQ 3

A.10.3 SM 1234 analog input/output module specifications

Table A-155 General specifications

Technical data	SM 1234 AI 4 x 13 bit / AQ 2 x 14 bit
Article number	6ES7234-4HE32-0XB0
Dimensions W x H x D (mm)	45 x 100 x 75
Weight	220 grams
Power dissipation	2.4 W
Current consumption (SM Bus)	80 mA
Current consumption (24 V DC)	60 mA (no load)

Table A-156 Analog inputs

Model	SM 1234 AI 4 x 13 bit / AQ 2 x 14 bit
Number of inputs	4
Type	Voltage or Current (differential): Selectable in groups of 2
Range	±10 V, ±5 V, ±2.5 V, 0 to 20 mA, or 4 mA to 20 mA
Full scale range (data word)	-27648 to 27648
Overshoot/undershoot range (data word)	Voltage: 32511 to 27649 / -27649 to -32512 Current: 32511 to 27649 / 0 to -4864 Refer to the section on input ranges for voltage and current (Page 1246).
Overflow/underflow (data word)	Voltage: 32767 to 32512 / -32513 to -32768 Current: 32767 to 32512 / -4865 to -32768 Refer to the section on input ranges for voltage and current (Page 1246).
Resolution	12 bits + sign bit
Maximum withstand voltage/current	±35 V / ±40 mA
Smoothing	None, weak, medium, or strong Refer to the section on step response times (Page 1245).
Noise rejection	400, 60, 50, or 10 Hz Refer to the section on sample rates (Page 1245).
Input impedance	≥ 9 MΩ, FS 07 and above ≥ 1 MΩ (voltage) / ≥ 270 Ω, < 290 Ω (current)
Isolation (field side to logic)	None
Accuracy (25 °C / -20 to 60 °C)	±0.1% / ±0.2% of full scale
Analog to digital conversion time	625 µs (400 Hz rejection)
Common mode rejection	40 dB, DC to 60 Hz

A.10.7 Measurement ranges of the analog outputs for voltage and current (SB and SM)

Table A-165 Analog output representation for voltage (SB and SM)

System		Voltage Output Range	
Decimal	**Hexadecimal**	**± 10 V**	
32767	7FFF	See note 1	Overflow
32512	7F00	See note 1	
32511	7EFF	11.76 V	Overshoot range
27649	6C01		
27648	6C00	10 V	Rated range
20736	5100	7.5 V	
1	1	361.7 µ V	
0	0	0 V	
-1	FFFF	-361.7 µ V	
-20736	AF00	-7.5 V	
-27648	9400	-10 V	
-27649	93FF		Undershoot range
-32512	8100	-11.76 V	
-32513	80FF	See note 1	Underflow
-32768	8000	See note 1	

[1] In an overflow or underflow condition, analog outputs will take on the substitute value of the STOP mode.

Table A-166 Analog output representation for current (SB and SM)

System		Current output range		
Decimal	**Hexadecimal**	**0 mA to 20 mA**	**4 mA to 20 mA**	
32767	7FFF	See note 1	See note 1	Overflow
32512	7F00	See note 1	See note 1	
32511	7EFF	23.52 mA	22.81 mA	Overshoot range
27649	6C01			
27648	6C00	20 mA	20 mA	Rated range
20736	5100	15 mA	16 mA	
1	1	723.4 nA	4 mA + 578.7 nA	
0	0	0 mA	4mA	
-1	FFFF		4 mA to 578.7 nA	Undershoot range
-6912	E500		0 mA	
-6913	E4FF			Not possible. Output value limited to 0 mA.
-32512	8100			
-32513	80FF	See note 1	See note 1	Underflow
-32768	8000	See note 1	See note 1	

[1] In an overflow or underflow condition, analog outputs will take on the substitute value of the STOP mode.